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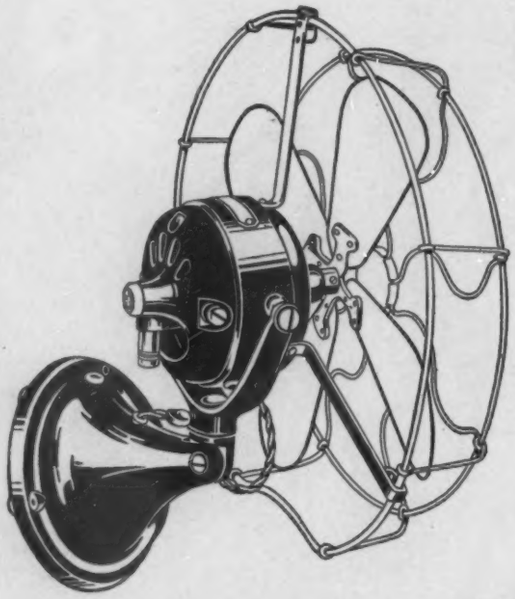

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UTAH POWER & LIGHT COMPANY'S SYSTEM

Southern Idaho, Utah and Western Colorado form a great inland empire whose rich mining and agricultural resources naturally seek Salt Lake City as a distributing center. This city likewise has recently been made the center of a great electric transmission line network spreading over this great plateau region. The centralization of power interests in this region was a logical outcome of the development of numerous isolated companies. Such centralization gives greater efficiency of operation, lower rates and better service.

These possibilities had long been recognized but it was not until late in 1913 that their consumation was made possible by the organization of the Utah Power & Light Company as a subsidiary of the Electric Bond & Share Company of New York. During 1914 this company purchased and consolidated twenty-five hydroelectric power plants in Utah and Idaho and started work on large new power developments along the Snake and Bear Rivers in Idaho. A 130,000 volt steel transmission line has been completed 135 miles south from these new power houses to a new substation 6½ miles from Salt Lake City and nearly half a million dollars has been expended in improving and extending the service to many districts which had not enjoyed the advantages of electric power. During this period also, control of the Western Colorado Power Company was acquired.

Map of Utah Power & Light Company's System.

The 1915 program has not yet been completed, but it already includes a ninety-nine year lease of the properties of the entire electric light and power business of the Utah Light & Traction Company in Salt Lake City and Ogden, together with the gas business in the latter city. It is quite possible that an advantageous solution of the difficulties of finance and competition which have beset the Idaho-Oregon Light & Power Co., the Idaho Railway, Light & Power Co., the Southern Idaho Water Power Co., and the Great Shoshone & Twin Falls Water Power Co., will be reached by merging with the Utah Power & Light Co. Announcement may soon be made concerning negotiations to this end.

Bear River Developments.

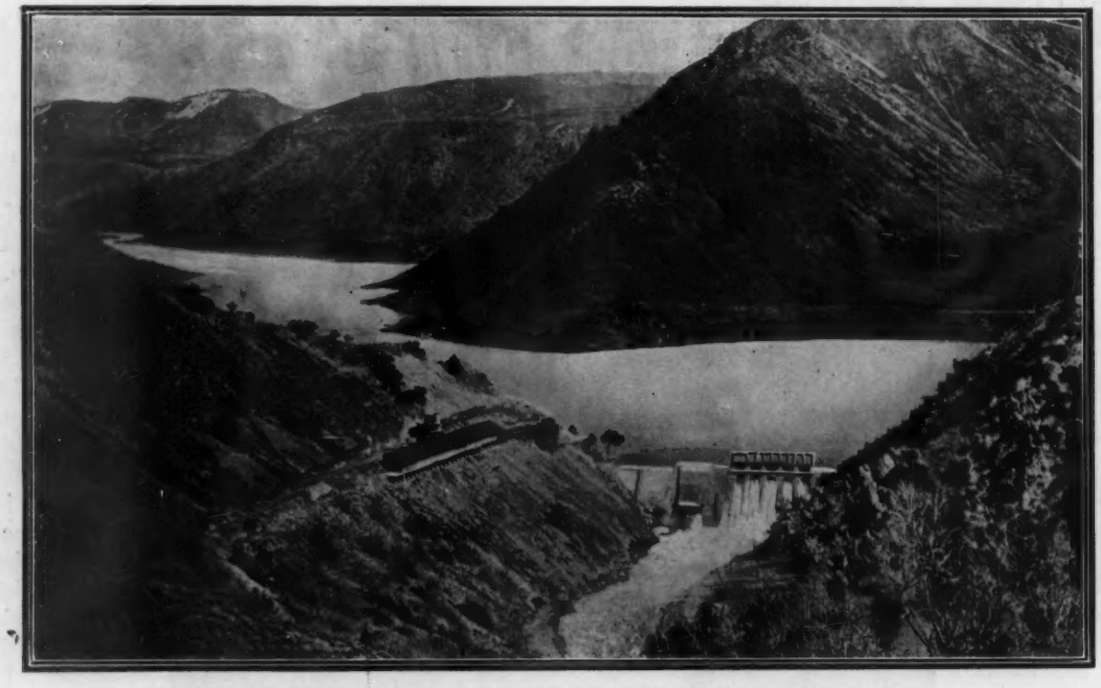
The extensive hydroelectric developments which have been made at Grace, Idaho, on the Bear River, are the largest single source of power for the system. Bear River is the largest stream in the interior basin. Rising in northeastern Utah, it flows northward through Utah and Wyoming, entering Idaho and then making a large loop southward, flowing south on the west side of the mountains and finally entering Utah again and emptying into Great Salt Lake. Bear Lake lies at an elevation of over 1,700 feet above Great Salt Lake, and the length of the river is slightly over 200 miles. At several points the river falls rapidly, and located at these points are the sites for the present and future power houses of the company.

In southeastern Idaho, Bear River flows near and to the north of Bear Lake, a large body of fresh water approximately 140 square miles in area. At one point, 4¼ miles distant, the river is considerably above the lake, while at another point, several miles down stream, the river is below the lake. By means of inlet and outlet canals the flood waters of the river are diverted and stored in the lake each year, and released during low water seasons. The capacity of the lake as a reservoir is such as to permit the equalization of the flow of the river, not only throughout a single year, but throughout a period of many years. The immense storage capacity of Bear Lake is also to be utilized in the development of important irrigation projects.

Several million dollars has already gone into new development work along Bear River—embracing the construction of a new inlet canal connecting Bear River and Bear Lake, the enlargement of the outlet canal connecting the lake and the river; the construction of a new power house at Grace, 67 miles down the river from Bear Lake, together with the completion of a wood stave pipe line 11 ft. in diameter and 25,000 ft. long at this site. The erection of a large reinforced concrete dam at Oneida, 34 miles farther down Bear River from Grace, and the erection at this point of a very large reservoir, together with the erection of a new power house below the dam, forms a second important division of the work along Bear River.

The first of two twin steel tower transmission lines 135 miles long, running from Grace, Idaho, to a new terminal substation six miles west of Salt Lake has been completed and is now in operation.

The new terminal substation was completed at a cost of over half a million dollars, and besides the power developed on Bear River, the electrical energy produced by practically all of the consolidated properties in Utah and Idaho is carried to the new terminal and from that point distributed over the system.



General View of Dam and Reservoir at Oneida Looking Up Stream.

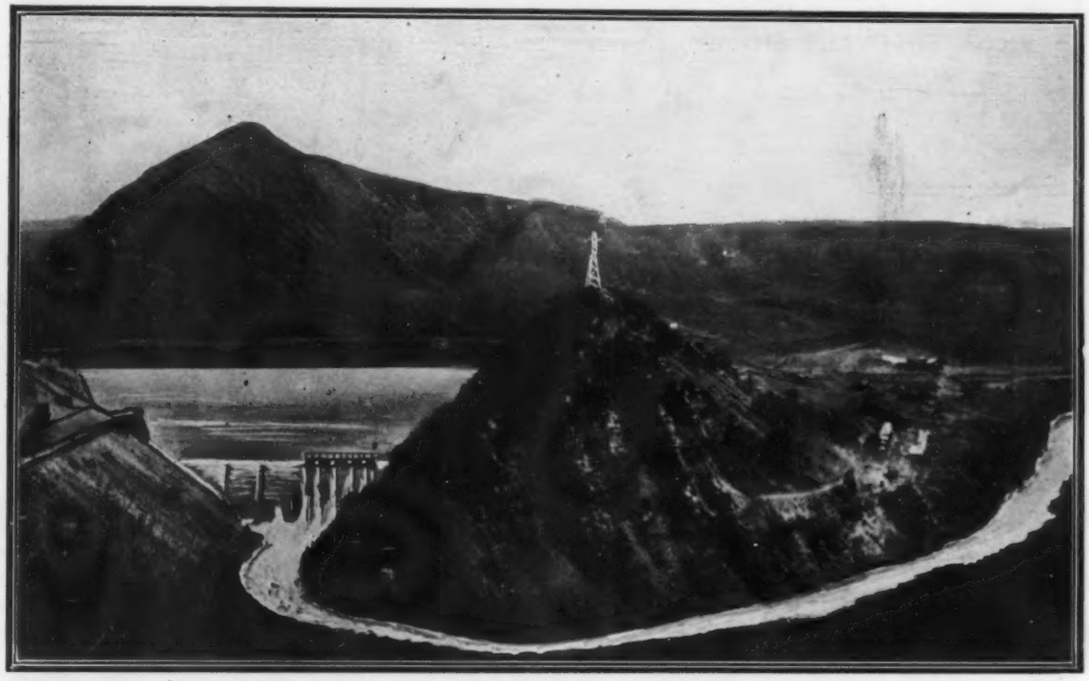
The first point on Bear River below the storage at Bear Lake at which the Utah Power & Light Company generates hydroelectric power is at Grace, 67 miles below the canal connecting the river and Bear Lake and approximately 130 miles in a direct line north of Salt Lake City. At this point the river makes a big bend and drops rapidly through a lava rock walled canyon. A timber crib, rock filled dam with a crest length of 340 ft. diverts the river water at the upper end of the canyon to pipe lines which carry the water nearly five miles across a plateau to the rim rock at the lower mouth of the canyon where penstocks lead down to the power houses located at the river's edge. The total installed capacity of these power houses is 33,000 kilowatts. The pipe line consists of 23,000 ft. of 11 ft. diameter wood stave pipe resting on concrete saddles, and terminating in a steel surge tank 30 ft. in diameter and 132 ft. high. The penstock leading down to the new power house is a

riveted steel pipe 2530 ft. long and varying in diameter from 7½ ft. to 6½ ft.

The installation in the power house at Grace consists of two 16,500 h.p. vertical, single runner, 514 r.p.m. Francis turbines with Kingsbury thrust bearings; two 11,000 kw., 6600 volt, 60 cycle, 514 r.p.m. generators; six 4000 kw. outdoor type, 6600 volts to 130,000 volt transformers, and three 2000 kw. outdoor type, 6600 to 44,000 volts transformers, together with outdoor high tension switching equipment completing the installation of the Grace power house. Power is delivered to two 130,000 volt lines and three 44,000 volt lines.

Power is delivered to the main 130,000 volt lines leading from Grace to Salt Lake City.

At Wheelon, Utah, about 90 miles north of Salt Lake City on Bear River, the stream cuts down through a low range and forms a rugged canyon several miles long. The river is diverted at the upper end of the canyon by a rock filled, timber crib diversion dam into two canals located upon the two sides of the canyon, one canal being 8500 ft. long, and the other 8100 ft. long, both cut most of the way through solid rock. A continuous penstock in the form of an inverted syphon leads from one canal to the other, and the turbines are fed from the lowest point. A



Oneida Dam and Power Site on Bear River.

Oneida is on Bear River in Idaho 34 miles below Grace and about 110 miles in a direct line north of Salt Lake City. The work here includes a gravity section concrete dam 85 ft. high, 328 ft. long at the top, with a volume of 25,000 cu. yds. By means of this dam and approximately half a mile of waterway a gross head of 120 ft. is secured at Oneida. The dam and waterway form a large peak load reservoir ideal for governing purposes and for carrying peak loads far in excess of the average power available from the stream flow. The dam and intake house, the latter a concrete and steel structure built in an earthen dike with gates and openings for two 16 ft. diameter pipes and the first installation of the power house, together with the pipe lines, have been completed. The pipe line is 2225 ft. long, terminating in a steel surge tank 40 ft. in diameter and 104 ft. high, from which two 12 ft. diameter steel penstocks each 150 ft. long lead to the turbines of the new power house. The first installation of the latter consists of two 15,000 h.p. vertical, single runner, Francis turbines; two 10,000 kw., 6600 volt generators; six 4000 kw. outdoor type, 6600 volts to 130,000 volts transformers, and a complete outdoor type, high tension switching equipment. Power is delivered to the main 130,000 volt lines leading from Grace to Salt Lake City.

At Wheelon, Utah, about 90 miles north of Salt Lake City on Bear River, the stream cuts down through a low range and forms a rugged canyon several miles long. The river is diverted at the upper end of the canyon by a rock filled, timber crib diversion dam into two canals located upon the two sides of the canyon, one canal being 8500 ft. long, and the other 8100 ft. long, both cut most of the way through solid rock. A continuous penstock in the form of an inverted syphon leads from one canal to the other, and the turbines are fed from the lowest point. A static head of 115 ft. is secured at the power house. The installation at the latter consists of five horizontal double Francis turbines, four of which are 1700 h.p., and one of which is 5500 h.p.; five 2300 volt, 60 cycle generators, four of which are 1000 kw. each, and one of which is 3125 kw. Several banks of transformers step the current up to 44,000 volts for feeding into the main 44,000 volt system, and three 4000 kw. outdoor transformers with switching equipment are installed for tying the station into the main Grace-Salt Lake 130,000 volt lines of the Utah Power & Light Company which pass through Wheelon.

Riverdale Power Plant.

The Riverdale power house is in the Weber River Valley and its water is secured from a canal which is used for combined irrigation and power. This canal is 8½ miles long, concrete lined with a top width of 34 ft., a bottom width of 22 ft., and a depth of 6 ft. Two pipes 1600 ft. long, one varying in diameter from 7 ft. 3 in. to 5 ft. 5 in. and the other varying from 5 ft. 5 in. to 3 ft. 10 in., convey the water to the power station. Here the installation consists of two single horizontal Francis turbines, one of 2000 h.p. and the

other of 3750 h.p.; two, 2300 volt, 60 cycle generators of 1250 and 2500 kw. respectively, together with three 833 kw. and three 420 kw. transformers which step the voltage up to 44,000. The Riverdale station ties into the main 40,000 volt system of the Utah Power & Light Company.

Western Colorado Power Company's Station at Ames.

Tacoma Power Plant.

Olmsted Station.

The Olmsted Station is on Provo River at the mouth of Provo canyon about 40 miles south from Salt Lake City. Water is diverted from the river by means of a low rock filled, timber crib dam, 16 ft. high and 125 ft. long, and is carried five miles in a wooden flume averaging 6 ft. by 8 ft., to a point on the canyon side just above the power station.

From this point three penstocks each 875 ft. long, and varying from 5 to 4 ft. in diameter, lead directly to the turbines. The static head is 340 ft., and the installed generating capacity of the plant is 7200 kw.

The installation consists of three 4000 h.p., single, horizontal 300 r.p.m. Francis turbines; three 2400 kw., 2300 volt, 60 cycle, 300 r.p.m. generators, and nine 1000 kw., 2300 volt to 44,000 volt transformers. The Olmsted station feeds into the company's main 44,000 volt transmission system over three lines.

The Terminal and Substation Near Salt Lake.

The terminal and substation recently completed as the main operating center of the company's entire transmission system is approximately 6½ miles west of Salt Lake City. The substation forms the terminus for the double circuit 130,000 volt, steel tower transmission lines from the Bear River power stations and from this terminal 44,000 volt lines radiate out in all directions, tying in the various smaller power houses and supplying the company's market. No power is delivered to customers at 130,000 volts. The current is stepped down to 44,000 volts, and at present nine 44,000 volt feeders radiate from the terminal. The new substation facilities are such that five more 44,000 volt feeders may be connected at any time.

The substation is of the outdoor type, covering an area of 500x600 ft. A substantial brick building houses a switchboard, a large synchronous condenser for voltage regulation and various auxiliary apparatus. All of the 44,000 and 130,000 volt apparatus is outdoors. The transformers are six in number, being 7500 kw., 60 cycle, and 130,000 volt to 44,000 and 6600 volts. The synchronous condenser is 7500 k.v.a., 6600 volt, 60 cycle. A complete equipment of automatic high tension switches is provided.

Among the feeder lines running out of the new substation at present are those which supply power to Magna and Arthur mills and the other properties of the Utah Copper Company at Bingham and Garfield, Utah.

Idaho Falls System.

Running northwest from Idaho Falls is a 44,000 volt transmission line 67 miles in length fed by a 2500 h.p. hydroelectric plant at Idaho Falls, 130 h.p. at Teton and 230 h.p. at St. Anthony, 130 h.p. of which is a steam reserve plant. This line serves light and power to Idaho Falls, Rigby, Rexburg, Sugar City and St. Anthony.

Western Colorado Power Plants.

The Western Colorado Power Company, with general offices at Durango, and sub-headquarters at Telluride and Silverton, Colorado, is a subsidiary of the Utah Power & Light Company. The Western Colorado Power Company serves a territory in southwestern Colorado extending from Delta south to Durango and including the towns of Delta, Montrose, Olathe, Ridgway, Ouray, Telluride, Pandora, Ophir, Silverton and Durango. This is the most rugged portion of western Colorado, and is familiarly known as the San Juan Mining District. The Ilium station at Ilium, Colorado, generating 12,000 kw., the new Ames station at Ames, Colorado, generating 3600 kw., the old Ames station generating 1200 kw., and the Tacoma station at Tacoma, generating 4500 kw., with the station at Ouray, generating 450 kw., comprise the principal power developments of the Western Colorado Power Company.

Power House at Wheelon, Utah.

These power plants lead into a system of transmission lines that include 76 miles of 44,000 volt lines, 70 miles of 17,000 volt lines and 100 miles of 10,000 volt lines, together with many miles of lines of lower voltage. The territory from Delta to Durango is approximately 180 miles long, and includes most of the important mining camps and mining centers of southwestern Colorado.

Installation at the Ames power station of the Western Colorado Power Company includes one 3600 kw. generator driven by two impulse water wheels operating under two heads. The larger operates under a static head of 624 ft., and the waterpower for this wheel is secured from Howard Fork Creek. Power is generated in the Ames station directly at 11,000 volts and sent out over duplicate lines to Telluride and the mines in that vicinity.

Two generators, aggregating 4500 kilowatts and driven by impulse water wheels operated under a

static head of 998 ft., are included in the power station installation at Tacoma, one of the principal plants of the Western Colorado Power Company. The power is stepped up from generator voltage to 44,000 volts and transmitted at that pressure south to Durango and north to Silverton. At Silverton the voltage is reduced to 5700 volts for distribution to the mining districts tributary to that point. Water from the Tacoma plant is derived from a very fine reservoir system on Cascade Creek.

Additional Plants.

Smaller hydroelectric developments, representing plants of other companies which have been merged, are situated at Paris, Georgetown and Cub River, Idaho, and Logan. Farmington, Mill Creek, Jordan Narrows, Alpine, American Fork, Battle Creek, Snake River, Murdock, Santaquin and Park City, Utah. A 1200 h.p. steam plant at Farmington, Utah, and 230 h.p. at Downey, Utah, are also owned by this company. The company leases a 3300 h.p. plant at Hyrum and a 465 h.p. plant at Willard, as well as all the plants of the Utah Light & Railway Company, including the 13,600 kw. Jordan steam station and plants at Devil's Gate, Granite, Stairs, Pioneer, Weber Canyon, Cottonwood and Ogden Canyon.

The Utah Power & Light Company thus controls generating equipment capable of generating close to 150,000 kw. In addition to caring for the light and power needs of most of the towns in the territory large blocks of power are sold to mining and irrigation companies. Great economies have been effected by the consolidation and unification of these numerous plants and the future development of the territory will be largely advanced by the potent aid of electricity thus put in its service. Particular acknowledgment is due to the booklet distributed at the Salt Lake City meeting of the mining engineers last August for much of the information and all of the illustrations used in the preparation of this brief description of what bids fair to be the greatest example of centralization of power supply which is to be found in the United States.

The electric copper smelting furnace may be used to advantage in localities where conditions are not favorable to the use of the reverbatory or the blast furnace. A discussion of experiments and possibilities in the smelting of copper ores in the electric furnace has been recently made by Dorsey A. Lyon and Robert M. Keeney in Bulletin No. 81 of the U. S. Bureau of Mines. They conclude that the electric furnace, on account of its neutral atmosphere, is particularly well adapted to the smelting of native copper ores and concentrates. The power consumption for smelting fine Michigan native copper concentrates carrying 25 to 40 per cent of copper should not exceed 625 kw.-hr. per ton of ore smelted. The electrode consumption should not exceed 10 lb. per ton of charge. Under special conditions where power can be had at ½ cent per kw-hr. or less and where coke is expensive electric smelting and semipyritic smelting of sulphide ores offer most promising fields for the use of large blocks of power.

THE FACTS CONCERNING LOS ANGELES AQUEDUCT WATER CASE.

BY F. C. FINKLE.

(After pointing out that the recent decision regarding the purity of Los Angeles aqueduct water did not disprove the pollution of water entering Haiwee reservoir, the author brings evidence to prove that the storage period is much less than the thirty days claimed. Mr. Finkle is a consulting engineer at Los Angeles and member A. S. M. E., A. W. W. Assoc. and Assoc. Member A.I.E.E.—The Editor.)

So much confusion exists regarding the termination of the recent water suit regarding the purity of Los Angeles aqueduct water and so many divere theories are advanced, that it may be desirable to have the facts made public. In the trial it was not denied by the City of Los Angeles, as defendant, that the water of Owens River was polluted, at and above the intake of the aqueduct, and in the open aqueduct of approximately 60 miles length from the intake to Haiwee reservoir. Messrs. Frost and Hart, the plaintiffs, made complete proof of this fact through the bacteriologists, Dr. Leonard of Los Angeles, and Dr. Victors of San Francisco. The tests made for the city showed the same state of pollution at all points above Haiwee reservoir.

As has been called to the attention of the public, that pollution results from the populated districts in Owens Valley, using the water for irrigation and sanitary purposes, before it enters the aqueduct, and using the lands and swamps in Owens Valley for the pasturing of stock, slaughter houses, etc. This pollution results in the depositing of fecal matter, putrid and decomposed animal and vegetable matter, etc., in the water of Owens River tributary to the aqueduct.

As a result, the bacterial count was high and the bacillus coli was present in samples of one-tenth of a cubic centimeter. As a result of these conditions, which could not be denied by the city, there was substantial agreement as to the state of the pollution of the water upon entering Haiwee reservoir, and the opinion of Judge Works sustained the fact of this pollution.

As to the condition of the water at various points below Haiwee reservoir, down to the city of Los Angeles, there was some disagreement, but the tests made by both sides showed the bacterial count abnormally high at Fairmont reservoir, at the Cascades in San Fernando Valley, and at the Franklin canyon reservoir, where the water is delivered to the city pipes. The tests almost invariably showed bacillus coli in one-tenth of a cubic centimeter at these points.

As to the explanation for the condition of the water from Fairmont reservoir to Franklin reservoir, there was some difference of opinion between the experts for the plaintiffs and those for the city. The plaintiffs' experts contended that the bacteria survived in passing through Haiwee reservoir and the aqueduct to the city, while the city's experts contended that the high bacterial count and the presence of bacillus coli at the points of delivery into the city, were due to fecal matter deposited by ducks on the water of the reservoirs, and to contamination in San Francisquito canyon.

The defense of the city was that the water, although polluted upon entering Haiwee reservoir, would become safe because of storage in the reservoir, which storage period was claimed to be not less than 30 days for all water. They all agreed that this would exterminate the disease producing bacteria, and make the water safe against contagion, although it would still leave its objectionable taste and color.

One of the leading experts for the city stated that the same would be true of sewerage, if stored for 30 days in a reservoir. Hence the defense for the city was, that the storage in Haiwee would make the water safe, although it would still remain objectionable when considered from an esthetic point of view.

When this defense was offered by the city, the question resolved itself into one of hydraulic engineering, namely the time of storage in Hawaii reservoir. This is the reason why the plaintiffs failed to make out a case, according to the opinion of the judge who held that the evidence showed that the water, although polluted, would be made potable by 30 days' storage in Haiwee reservoir.

In support of its contentions in this regard the city called upon several of the engineers regularly employed by it. Their position was, to use the illustration of one of them, that Haiwee reservoir might be likened to a trough which would be filled with marbles. If one marble should be added to the upper end, and another withdrawn at the lower end, in regular rotation, the length of time for one marble in passing from the upper end to the lower end of the trough would be governed by the rapidity with which the marbles were withdrawn. Thus the theory was, that the time of storage is equal to the capacity of the reservoir divided by the draft. The theory that the time of storage in Haiwee is determined by dividing capacity by draft is untenable, when conditions are viewed from the standpoint of an hydraulic engineer.

The writer knows, that at certain periods of the year, in fact, during the greater part of every year, the wind in Owens Valley blows from a northerly to a southerly direction. The valley lies in a trough, and the wind currents produced by the cold air from the mountains descending into this trough strike the White Mountains on the east side of the valley, which direct the wind in a southerly direction towards Owens Lake, where it follows the mountains through the gorge, in which Haiwee reservoir is constructed. As the wind passes down this gorge it sweeps along the surface of the water in the present reservoir and causes heavy waves to travel down towards the lower Haiwee dam.

We may say that there are three very prominent authorities in the United States on this subject, namely Mr. Allen Hazen, Mr. Geo. H. Whipple and Mr. Wm. P. Mason. It is therefore, interesting to note what these men say on the subject.

The following is from the pen of Mr. Allen Hazen, and is to be found in the "American Civil Engineers' Pocket Book," Sec. 10, under Water Supply, etc., at page 194:

"Period of Storage: The normal period of storage of large reservoirs is expressed in days and is taken to be the capacity of the reservoir divided by the average daily flow through it. This expression is useful for comparing different reservoirs, but it means little as far as indicating the length of time that the water is actually stored on account of the variations in volume of the water entering the reservoirs. For example, in a reservoir that has a normal period of storage of thirty days there may be one or more times each year when the stream flow is sufficient to displace all the water in the reservoir in two or three days. Furthermore, the water entering the reservoir at one end reaches the outlet at the other end not always after the displacement of all the waters, for by reason of difference in the density of water due to difference in temperature, the action of the wind, etc., part of it may cross the reservoir in a period much shorter than that required for displacement, so that even in a reservoir that has a normal storage period of thirty days the actual time of transit of water from the inlet to the outlet may be reduced to a period of a few hours. For this reason storage reservoirs cannot be depended upon alone to protect the water supply from a sanitary standpoint.

Horizontal Currents Induced by the Wind: Wind blowing over the surface of a body of water causes a movement of the surface water in the same direction. The velocity of such induced currents of water varies according to the intensity and duration of the wind. Experiments made at Lake Erie have shown that for winds blowing in one direction for at least ten hours the velocity of the surface water is from 3 to 7 per cent of that of the wind. For winds blowing long from one direction this per cent increases. The depths of such induced currents or the velocity of currents below the surface are not well known, but are doubtless 10 to 20 feet."

Mr. Geo. H. Whipple, another authority on the subject, as generally accepted as Mr. Hazen, in his book, entitled "The Microscopy of Drinking Water," at page 103, states as follows:

"According to the Owasco Lake experiments a wind velocity of five miles an hour would cause the surface water to move at the rate of 13 ft. per minute, while a 30 mile breeze would cause a water movement of 26 ft. per minute."

"Thus at Owasco Lake, the velocity at a depth of 10 ft. was about 60 per cent of the surface velocity, and 20 ft. 25 per cent of the surface velocity."

Mr. W. P. Mason, C. E., M. D., L. L. D., read a paper on the "Advantages and Disadvantages of Reservoir Storage," before the Franklin Institute, January 29, 1914. In the course of his paper, Mr. Mason used the following language:

"Thus to quote from the figures of Mr. Ackerman, who made tests, with a wind movement of six miles per hour, the percentage which the water movement was of the wind movement was as follows: At 5 ft. depth, 3.2 per cent; at 10 ft. depth, 1.74 per cent; at 15 ft. depth, 0.87 per cent; at 20 ft. depth, 0.75 per cent."

"There is no question but that this particular case, will cause many of us to materially amend our notions about the dependence to be placed upon lake and reservoir storage as a means of protection against the evils following water pollution."

It would seem that the above authorities are directly in point and, if applied to the present case of the Haiwee reservoir, prove that the time of storage, instead of being determined by capacity divided by draft, is more greatly influenced by the induced velocity due to winds; and it may readily be calculated that the time of storage, instead of being 30 days

or more, is likely to be anywhere from four to ten days, under the condition usually prevailing in that locality.

The plaintiffs in the case called Mr. Cyril Williams, an engineer of recognized standing, to testify that, under certain conditions, the water would move through Haiwee reservoir from the upper to the lower end in as short a time as 3½ days. Mr. Williams based his conclusion upon his experiments made with floats on Haiwee reservoir and also on Lake Chabot.

Against his testimony was the denial made by the engineers employed by the city. However, Judge Works evidently gave weight to numbers in deciding this phase of the controversy, instead of being guided by the engineering principles. This is not said in any way as a reflection upon the judge, who is not a technical man, but as is frequently the case, when technical testimony is supported by the greatest number of witnesses, it is accepted as correct in a court of law, particularly when the men supporting the theory are not only the most numerous, but their reputation on account of residing in the locality, or because of their occupying official positions, is considered to have weight in the mind of the court.

The plaintiffs, either on account of lack of funds or judgment in presenting the case, failed to employ any hydraulic expert on this subject, except Mr. Williams. They should by all means have done so, in order to have had this phase of the controversy thoroughly presented to the court. If the plaintiffs had called a man of the standing of Allen Hazen, for example. supported by other men of local reputation in the state of California, to assist in the work, there is little doubt that the decision of Judge Works would have been different. For he is generally recognized as an able and fearless judge.

One local newspaper, whose owner is interested in the aqueduct, by reason of owning large tracts of land in San Fernando valley, which are to be irrigated with the aqueduct water, and which will greatly enhance his land's value, published a statement that the writer was connected with the recent litigation. This statement is malicious and without any foundation in fact, as the writer had nothing to do with the starting of the case, or working it up, and never was in court one moment during the trial, but was completely occupied by other matters the whole time.

Had he been connected with the case, the Los Angeles water department may rest assured, that the hydraulic question, relating to time of storage in Haiwee, would have been presented so thoroughly and so completely supported by unimpeachable authorities, that no such decision, as that rendered on this point, could have been given. In order to do this it was only necessary to make the necessary experiments to demonstrate the truth.

In conclusion it may also be well to call attention to the fact that no one knows if Haiwee reservoir can ever be used as proposed by the city of Los Angeles. It has been completed considerably over two years, but has never been filled to more than one-half its depth, owing to the copious leakage through the foundation and around the dam.

During the time it has been partially filled, there have been two slides from the upper face of the dam, which had to be repaired at very great expense. The leakage has constantly increased, and it is probable that, should the reservoir ever be filled, it will share the same fate as the late Zuni dam in New Mexico.

Again the hydrograph of the flow from Owens River shows that for long periods the Haiwee reservoir would in certain years be nearly or entirely empty, if completely filled whenever possible, and then used under full draft of 20,000 inches during the entire year. These conditions must, and should have been taken into account, in considering the time of storage in Haiwee, for when the reservoir is nearly or entirely empty, as can be proven it will be, by the run-off tables of Owens River, published by the city of Los Angeles, it will become a mere question of velocity of flow through the reservoir basin, under conditions which will mean only a few hours, or fractional part of a day, for the water to pass through it.

RULES OF THE GAME.

First of all is the rule of publicity, not doing anything under cover, letting the public know what you are doing and judge of it as it is. There are a great many businesses in this country that have fallen under suspicion because they were so secretive, when there was nothing to secrete that was dishonorable.

In the second place, there is a full equivalent for money you receive—the full equivalent in service—not trying to skimp in the service in order to increase profits above a reasonable return, but trying to make the profits proportioned to the satisfaction of the people that you serve.

In the third place, this game requires something more than ordinary sports. It requires a certain kind of conscience in business, a certain feeling that we are after all in this world because we are expected to "make good" according to the standards of the people we live with.

The fourth rule, as it seems to me, is the rule of having the spirit of service. I am not meaning a sentiment, I am not meaning a state of mind; I am meaning something very concrete—that you want to see to it that the thing that you do for the public and get money for is the best thing of that kind that can be done.—Woodrow Wilson.

The Carnegie, the yacht employed to make a magnetic survey of the earth, has just reached Honolulu after having passed through the Panama Canal. From there the staff will make magnetic observations in the South Pacific Ocean. These include the magnetic declination, the horizontal dip and the intensity of the magnetic field, together with studies of atmospheric electricity. The sailing vessel is non-magnetic, being built of wood with locust spikes and copper sheathed below the water line. The auxiliary engine and all stoves are of copper, the 1400 lb. anchor is bronze and all metal fixtures are of non-magnetic material, all lamps being used throughout.

INDUSTRIAL USES OF FUEL OIL

BY F. B. DUNN.

Typical Reports Showing Economy of Oil.

The following report was recently sent to a local oil burning company, in answer to an inquiry as to the comparative cost of oil and steam service.

Replying to your recent inquiry, I beg to submit the following data on comparative cost of district steam at 60c per 1000 pounds of condensation and the cost of operating my own heating plant with fuel oil at 75c per barrel.

District steam from Dec, 22, 1912, in weekly bills as follows:

December 22d	$27.00
December 29th	24.60
January 5th	46.20
January 12th	36.60
	$134.40

The cost of operating my own heating equipment for the month of January, 1913:

80 barrels of fuel oil at 75c	$60.00
Lubricating oil	1.75
Repairing fire box	7.80
Estimated cost of electric current	4.50
	$74.05

A total saving of $60.35 for a month.

The size of the boilers are: Steam—Ideal S-36-8. Hot Water—Arco 1-25-W.

Report of cost of heating the Hearst Building, San Francisco:

Total radiation in building is	8750 sq.ft.
Hours operated daily	20 hours
Oil Consumptiin for year of 1912	2076.8 bbls.
Average consumption daily	5.7 bbls.
Size of motor operating burner	¾ h.p.
Cost of operating motor daily	21c

Oil at 70c per barrel, electricity at 21c = $4.20 cost per day

Report comparing the cost of gas and oil:

"Since using oil as fuel for heating water for the use of tenants and also furnishing steam heat for the building, I have noticed the following comparison: The cost of the oil for both heating water and building does not exceed $15 per month, as against a charge of $40 monthly which I paid formerly for gas to furnish hot water for the tenants, without heating the building."

Comparative report on coal and oil:

Coal bills from Oct. 15, 1911, to Oct. 15. 1912 ..... $1105.00
(Coal at $10 per ton.)

Oil bill from Oct. 15, 1912, to Oct. 15, 1913 ..... 292.96
(Oil at 80c per barrel.)

Electric bill for motors 57.64
(Electricity at 5c kw.)

A saving of $744.40 per year and the burners are operating more hours per day than when burning coal.

Comparison of Heating Costs Between Gas and Oil.

1. Building having 4 vacuum gas burning radiators.
2. Radiators operating 16 hours daily.
3. Gas cost on an average of $ .28 per day.
4. Gas cost $ .70 per 1000 cu. ft.
5. Manufactured gas contains as high as 650 B.t.u. per cu. ft.
6. Item No. 3 (.28) divided by item 4 (.70) per M = 400 cu. ft.
7. Item No. 5 (650) × 6 (400) equals 260,000 B.t.u. in 400 ft. of gas.
8. Crude oil contains an average of 18,000 B.t.u. per lb.
9. Crude oil can be bought at $ .85 per barrel.
10. One barrel of crude oil contains 42 gallons.
11. Item No. 9 (85) divided by item 10 (42) = .02c cost of one gallon of oil.
12. The average heating boiler will evaporate 12½ of water per lb. of oil, this is only allowing 66 2-3 per cent efficiency.
13. Item No. 8 (18,000) × item 12 (6 2-3) = 12,000 B.t.u. available.
14. Item No. 7 (260,000 cu. ft.) divided by item 13 (12,000) equals 21 lb. of oil necessary to burn to generate the equal amount of heat units as contained in 400 cu. ft. of gas.
15. One gallon of oil weighs about 8 lb.
16. Item No. 14 (211 lb.) divided by item No. 15, (8 lb.) = 2⅝ gal. of oil.
17. Item No. 16 (2⅝) × item 11 (2c) = 5¼c the cost of oil.
18. Item No. 3 (28) less item 17 (5¼c) = 22¾c per day saving.
19. The cost of operating electric motor is same for each system.

Comparison Cost of Heating With Service Steam and Oil.

1. Assuming building to have 5100 sq. ft. direct radiation.
2. Assuming building to have 610 Vento or indirect radiation.
3. 610 sq. ft. of Vento arranged as specified will condense 6 times as much water as an equivalent amount of direct radiation, or 3660.
4. 5100 plus 3660 = 8760 sq. ft. and is the equivalent direct radiation of the entire buiding.
5. Assuming that one sq. ft. of direct radiation together with pipe, etc., connecting same, will condense an average of 1-3 lb. of steam into water every hour.
6. Then 8760 divided by 3 = 2920 lb. of water per hour.
7. Assuming that steam is used 7 hours per day.
8. Then, 2920 × 7 = 20,440 pounds condensed daily.
9. The rate charged by the steam service company at 70c per 1000 lb. of water.
10. 20,440 divided by 1000 and multiplied by 70c equals approximately $14.30 as being the cost for steam service daily.
11. Multiply $14.30 by 30 days = $429.00 per month as the cost of street steam. For 12 months $5148.
12. Crude oil burned in the average heating boiler will evaporate 12 lb. of water per lb. of oil.
13. Then 20,440 divided by 12 = 1703 lb. of oil daily.
14. 1703 divided by 7.8 = 206 gal. of oil daily.
15. Assuming that oil weighs 7.8 lb. per gallon.
16. One barrel of oil contains 42 gal.
17. 206 divided by 42 = 4.9 barrels of oil daily at 85c per barrel = $4.15.
18. Two motors (1-3 and ½ h.p.) operating the two rotary systems will consume about 1000 watts per hour or 7000 watts daily.
19. The rate for operating the motors is about 5c per kw.-hr. or 7 times 5 = 35c per day for electric current.
20. $4.15 plus 35c = $4.50 or $135 monthly or $1620 yearly.
21. Deduct $1620 from item No. 11 ($5148.00) leaves a balance of $3528 in favor of oil as fuel.

Capacity of Heating Boilers With Oil as Fuel.

A boiler that will burn 5.5 lb. of oil per sq. ft. of grate surface, which is the average capacity of heating boilers, and that will evaporate 14 lb. of water per lb. of oil, will make steam at the rate of 77 lb. per hour per sq. ft. of grate surface, and as direct radiation will, under favorable conditions, condense steam back to water at the rate of 0.3 lb. per sq. ft. per hour, we find by the division of 77 by 0.3 that 1 sq. ft. of grate will furnish sufficient steam to fill 256.6 sq. ft. of radiation.

The capacity of a house heating boiler to carry radiation is limited by its rate of combustion and evaporation. With coal as fuel the average heating

boiler consumes 8 lb. per sq. ft. of grate, and evaporates about 9 lb. of water per lb. of coal. A boiler having 18.24 sq. ft. of grate area with an 8 hour rating of 4200 sq. ft. has been known to have evaporated 1848 lb. of water per hour. This is equivalent to about 40 per cent overload. The oil consumption was 132 lb. per hour, which shows a rate of 7.2 lb. of oil per sq. ft. of grate per hour and an evaporation of 14 lb. of water per lb. of oil.

The following test was conducted by a consulting engineer and an engineer representing a local school board in order to determine the efficiency of the Fess Rotary System:

Rating of Boiler—2625. S-36-6 Ideal Boiler.

Low Fire—2 Hour Test. Fess.	
Total oil used	78 lbs.
Total water used	113 gal.
Temperature of feed	59
Temperature of boiler room	78
Temperature of stack	490
Developed load in sq. ft.	2186
Per cent of rated load	83
Equivalent evaporation	14.008
Carbon in furnace	Trace
Smoke at top of stack	None
Noise of combustion	None
Medium Fire—3 Hour Test.	
Total oil used	167 lbs.
Total water used	245 gal.
Temperature of feed	59
Temperature of boiler room	81
Temperature of stack	580
Developed load in sq. ft.	3159
Per cent of rated load	120
Equivalent evaporation	14.186
Carbon in furnace	Trace
Smoke at top of stack	None
Noise of combustion	None
Heavy Fire—3 Hour Test.	
Total oil used	184 lbs.
Total water used	269 gal.
Temperature of feed	60
Temperature of boiler room	83
Temperature of stack	630
Developed load in sq. ft.	3465
Per cent of rated load	132
Equivalent evaporation	14.124
Carbon in furnace	None
Smoke at top of stack	None
Noise of combustion	None

Prof. R. C. Carpenter gives the following formula for direct heating by steam:

$$R = \tfrac{1}{4}\ (G + \tfrac{1}{4}\ W + .02\ n\ V.)$$

In which R = number sq. ft. radiation required.

G = glass surface.

W = exposed wall surface.

V = cubic contents of room.

n = number of times air in room is changed per hour.

This formula is for zero weather, in still air, in well constructed building.

Steam heating (Mill's Rule):

A very easy rule to remember is Mill's 2-20-200 Rule, in which the total amount of radiation required is obtained as follows:

$$\frac{\text{Glass}}{2} + \frac{\text{Exposed wall}}{20} + \frac{\text{Cubic contents}}{200} = \text{Sq. ft.}$$

of radiation.

Note—This rule does not work out well in the case of halls or rooms having less than ordinary amounts of wall and glass surface, where the opening and closing of outside doors changes the air frequently. In such cases the radiation should be increased 20 per cent or over.

THE JITNEY FROM THE COMMUNITY STANDPOINT.

"The jitney from the community standpoint"; its origin and reason for being; how it operates; present effect; probable future; and a complete survey of the community's interest in this new transportation scheme, is covered by an exhaustive report of a special transportation committee which has just been approved by the board of directors of the Oakland Chamber of Commerce and Commercial Club Consolidated. This committee, of which Stephen E. Kieffer, consulting engineer, is chairman, and of which the other members are J. H. L'Hommedieu, landscape engineer, and M. R. Sherwood, manager of the Sunset Lumber Company, made inquiries and an investigation throughout all the principal cities in the United States. The report is based upon that investigation.

The investigation was undertaken because it was believed that the dominant party at interest in any change of transportation units is the community, and that is covered by the opening paragraphs in which the committee says: "In all of the controversies and hearings over the jitney bus problem thus far, in the press and before legislative bodies, the positions taken and the views expressed have very naturaly been those of the interested parties from their immediate viewpoint—on the part of the street railways to protect their income and investment; on the part of the jitney owners to establish a business; and on the part of the traveling public to consult only its own temporary fancy, prejudices or convenience."

In another paragraph the committee asks: "Have we now reached the point where the electric trolley car is to be rendered obsolete and be superseded by the independently owned and operated small transportation unit traveling on "rubber and air" and propelled by its own power plant? Is this a scientific advance in urban transportation, and an economic necessity demanded by the people? Will it result in still further increasing traffic range and the economic residence limit from the business centers, or if not extending these limits will it add to the speed comfort or safety of the service within the present limits?"

The committee calls attention to the fact that in looking over the history of urban transportation we find the horse car giving way to the cable car, and the cable car (except under very special conditions) to the electric trolley car. There was an economic justification for each change which made it necessary and unavoidable. The wiping out of investments in the horse car, cable car, and earlier electric car lines and equipment, and replacement with the efficient and expensive modern equipment, had its justification in the accompanying social, physical and financial development and improvement of the people and communities affected. It was reflected in an increase in property values which greatly overshadowed the immediate investment in the transportation system destroyed.

Will the jitney do this?

It is quite conclusive that if the motor bus comes to stay, it will not be in the shape of the present jitney, and if the motor bus is to be the transportation unit of the future, it will supersede the electric car be-

cause it is economically right, and in doing so, it would justify the replacement of the present investments by enhancing the property values of the community.

This is the key note from the standpoint of the report. Will the jitney relieve congestion in apartment and tenement sections in the way that every city in America is striving to solve that problem, or will it only aggravate and increase the present difficulties? If it does not, what will become of the values beyond the 2½ mile limit which the committee finds to be the ultimate range of service of the jitneys? If the jitney weakens the present transportation systems which draw the support for unprofitable lines serving the outlying districts from the section where traffic is densest, what does it mean to the property owner and the home owner in the suburbs of Oakland, and the American city?

The committee believes that the jitney bus in a large measure is due to poor business, hard times, and the impossibility of men obtaining work of any kind. "Many of these men already owned small autos, or had saved enough money to buy an automobile, and in this way they went into the jitney bus business. For the present they are doing something for themselves and their families, their time is occupied and the nickels they take in enable them to eat at the expense of their autobus. In other words, the jitney driver is living upon his capital, or the capital of some one else, because the income is not sufficient to provide for his living and the necessary operating expenses, plus fixed charges and depreciation."

The cost of operation: Extended investigations of the committee showed them that the average jitney travels 137 miles per day with a car mile income of 5½ cents. Considering depreciation and cost of operation and allowing $3.00 to the driver, it was found that even the smallest jitney could not run for less than 7 cents per mile. This emphasizes the fact that most drivers are living at the expense of their auto bus on their capital rather than on their income.

Effect upon securities: Investigation of certain standard traction bonds in California with a par value of $107,422,000 showed a shrinkage from December, 1914, to March, 1915, of $8,887,000 or about 8¼ per cent.

The ultimate effect of this is appreciated by anyone who considers that over $60,000,000 worth of California electric railway bonds are held by savings banks and local investors in California, or in other words, by home people. $430,767,705 in outstanding stocks and bonds was the total for thirty street railroads on June 30, 1913.

Effect upon the state and municipalities: The state receives 5¼ per cent of the gross income of street railways and the total tax paid on gross income amounts to about 12 per cent. This means a total loss to the public on principal lines of the state of $300,000 per annum, aside from the other form of taxation placed by the public upon street railways in the building and maintenance of that portion of the street occupied by the roadbed.

Effects upon streets: It was found that in London where the motor bus has attained its greatest prominence, the fact was brought out in a hearing before Parliament that whereas the cost of maintaining a certain road surface prior to the advent of the motor bus was 6.483 d. per square yard, it was increased to 13.403 d. after one year of bus traffic, or slightly over 100 per cent. In this case it was the public—or in other words, the Middlesex County Council—appearing in its own behalf to demand relief from a new burden of taxes imposed by the bus traffic.

Congestion in streets: During the rush hour from 5 to 6 p. m., the average number of passengers transported in the 5-cent limit from the business center of Oakland (a length of 3 blocks on Broadway) is 113,000. Approximately 13 jitneys would be required to give the same carrying capacity as one street car. In Oakland, to handle the above traffic requires 234 cars with a headway of 15 seconds. To move the same traffic with jitneys at 13 to 1 would require 3000 cars.

No further argument need be advanced as to the necessity for fewer and larger transportation units in the congested districts during rush hours or normal hours of large traffic.

It may be argued that the future of the motor bus rests not with the present so-called "jitney," but in the larger bus of from 20 to 30 passenger capacity, and operating over longer routes. This system to be a success could only be inaugurated by a corporation with the necessary capital, and would at once come under the classification of a public utility and subject to the same charges and regulations as the present street railways.

To do less would be to retain the unreliability of the small jitney. Such a service, to be acceptable and fulfill the requirement established as the basic principle of this argument—that of maintaining or increasing property values—must in all respects correspond to that of the railways, except only in the type of vehicle used. Whether the large motor bus would be more acceptable to the public than the street car is questionable. It has not proved so in San Francisco in competition with the street car or small jitney.

Its cost of operation would undoubtedly be higher per passenger mile than that of the street car, and its financial success would probably be classed with that of the small jitney when operating under the single fare and transfer system for long hauls or rough territory.

The logical conclusion from the committee's report is that if the public continues to support the jitney, and thereby weakens the street railways and ultimately put them out of business, they must expect a zone system of fares, because the small jitney cannot operate over a much longer route than three miles at a profit. The American cities have religiously fought the zone system on account of the destruction of property values and the congestion of population.

The Oregon water power tax on new development was abolished at the recent legislative session and the license fee on old and new projects reduced to a nominal amount. This tax discouraged development and yielded little revenue.

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The Dalles-Celilo Canal

During the past week the great inland empire of Idaho, eastern Oregon and Washington, has been celebrating the completion of The Dalles-Celilo canal, which removes the last barrier to navigation over a five hundred mile waterway, giving ocean outlet to a productive area larger than the German Empire. For many years the cascades in the Columbia River have interfered with communication between its upper and lower reaches, between which there is a difference of elevation of about eighty feet within a length of nine miles. This is circumvented by eight and a half miles of canal and locks, which have been completed by government engineers after ten years of work and an expenditure of nearly five million dollars.

At Oregon City, likewise, the people are rejoicing in a lock system whereby the Willamette River, which is tributary to the Columbia at Portland, is made navigable as far south as Eugene. These two projects combine to make the Columbia River one of the greatest navigable waterways of the world and should be instrumental in the rapid development of the territory drained.

This mighty river through countless ages has cut a mighty chasm transversely through the basalt barrier of the Cascade Mountains, which here reaches elevations of eight and ten thousand feet. Its source is in the Canadian Rockies, which thus separate the drainage to the Pacific Ocean, by way of the Columbia and the Colorado Rivers, and to the Atlantic by way of the Mississippi. But for beauty and grandeur of scenery, for desirability of residence, and for future possible developments the region drained by the Columbia is without a peer.

The consummation of this project is being hailed with the same hopefulness as characterized the completion of the great locks in the Mississippi at Keokuk, Iowa, fifty years ago. And in accord with the habit of history, evidence is already at hand that, like the locks at Keokuk, the Celilo canal, will be eventually submerged by a great dam built to utilize the water-power here avaiable.

Centralization

The benefits to be derived from the unification of power supply throughout a great region have seldom been more strikingly portrayed than in the case of the Utah Power & Light Company, some of whose properties are illustrated and described in this issue. Whereas formerly a large number of independent plants were serving almost an equally large number of isolated towns, now they have been all tied in under one management and have been given physical connection by a transmission network which insures continuity of service in case of mishap to any individual plant.

Yet there are those who decry this centralization of power supply because it involves more or less cen-

tralization of power control. The evils which resulted from consolidation of competing railroads and manufacturers are cited and the old bugaboo of restraint of trade is brought forth.

These alarmists have not learned the fundamental economic difference between an industrial company and a public utility,—between trade and service. Trade is a hardy animal, thriving amid the cold blasts of competition; service is more tender and requires protection. Industrials are natural competitors, utilities are natural monopolies requiring regulation and protection. The establishment of regulating commissions in almost every state of the union demonstrates the wide recognition which is given this truth and as its import is more fully realized public disapproval of utility consolidations will be eliminated.

Better service and cheaper rates have invariably resulted from such consolidations. Large organizations can better afford to pay the salaries of the high grade men who are necessary to direct more efficient management, better engineering talent is available, money for additions and extensions can be obtained on better terms, and materials can be purchased more cheaply than by several independent smaller companies.

But paramount to all these advantages of a large organization over a smaller one is the basic distinction that a public utility is a natural monopoly. It wipes out the waste due to duplication of effort, all endeavor is constructive and the resources of the community are more completely developed.

Just now the Idaho Commission is investigating the proposed merger of several electric companies, two of which are in the hands of receivers. Under the past conditions of duplication of service and diversity of purpose the towns reached by these several companies have been under a serious disadvantage as compared with those served by one great organization, average rates have been higher and service has been poorer. When the principles already outlined are thoroughly in mind the benefits of the unification of these different properties is self evident.

National Electrical Safety Code

The U. S. Bureau of Standards has submitted for discussion and criticism a preliminary draft of a proposed electrical safety code which is intended to perform the same function for life protection as the Underwriters' Code now affords for fire protection. At present Dr. Rosa, chief physicist for the bureau, is holding hearings in Pacific Coast cities with representatives of the industrial and public service commissions, municipal electrical inspectors, engineers of operating companies and the electrical workers.

All parties concerned seem to agree that the plan is an excellent one and aside from a few minor changes the tentative code will require little modification. It in no way conflicts with the fire code and overlaps but little. For the first year compliance with its provisions will not be mandatory, but after such a period of test it is expected that state and municipal authorities will require a strict enforcement of the rules.

The code is divided into four main divisions. The first three consist of rules for the installation and maintenance of electrical supply stations, signal and supply lines, and utilization equipment respectively. The fourth part consists of safety rules for operation of electrical equipment and lines.

In general, the construction rules consist of detailed instructions regarding the application of three principles: permanent grounding, so that no harmful voltage can exist between the grounded object and neighboring conductors, proper guarding to remove the liability of dangerous contact or unsafe approach, and adequate spacing about all electrical equipment.

The enforcement of these rules will undoubtedly meet with the hearty co-operation of all operating companies. "Safty first" is no longer a meaningless symbol, but an active working principle in the great majority of electric companies. The provisions are reasonable and provide maximum protection at minimum cost. Many can and will be added to existing installations in order to provide additional safety for workmen.

An important part of the code are the explanatory notes regarding each rule. These are a great aid to the understanding and constitute an excellent text on methods of safe construction and operation. The fact that the U. S. Government has seen fit to aid in establishing suitable standards for safety should be a source of congratulations to the entire electrical industry, especially as it will lead to a desirable uniformity of construction and operating methods throughout the country.

The Inconsistency of the Baume Scale

Investigators have frequently tried to express the mathematical relationship between the specific gravity of a liquid and the arbitrary scale established by Antoine Baume, a distinguished French chemist, in the latter part of the seventeenth century. While for liquids heavier than water a simple expression suffices, various complexities made difficult the selection of an equation for liquids lighter than water, such as oil. For a long time there was great confusion because of the many equations proposed for converting the arbitrary scale of the Baume hydrometer into the more scientific specific gravity readings. Within the past few years, however, under the example set by the U. S. Bureau of Standards, American engineers and scientific men seem to concur in the equation:

$$\text{Specific Gravity} = \frac{140}{140 - \text{Baume Reading}}.$$

Notwithstanding this concurrence, the fact that there are separate scales for liquids heavier than water and those lighter than water has created endless confusion and suggests the need for now abandoning the empirical Baume scale in favor of the more rational specific gravity notation. This subject is one which might well receive the attention of the International Engineering Congress this year.

PERSONALS

F. H. Leggett, sales manager of the Western Electric Company, is at Los Angeles.

John T. Faig, professor of mechanical engineering, University of Cincinnati, is a recent visitor at the Exposition.

H. H. Cudmore, representative of the Mazda Bureau, San Francisco, returned Monday last from a business trip to Portland.

Geo. A. Damon, consulting engineer at Los Angeles and dean of the Throop College of Technology at Pasadena, is at San Francisco.

J. Snyder, manager of the United Electric Company at Toronto, Canada, is now in charge of their exhibit at the Exposition at San Francisco.

Chas. Baker, Westinghouse engineer with Hunt, Mirk & Company, San Francisco, is on a business trip through the southern part of California.

S. P. Russell of the sales department of H. W. Johns-Manville Company, San Francisco, returned the first of the week after a business trip to Los Angeles.

Fred Poss, Pacific Coast manager of Benjamin Electric Company, San Francisco, returned the first of the week from an extended trip through the Northwest.

N. K. Cooper of the sales force of the Westinghouse Electric & Manufacturing Company, San Francisco, recently returned from a business trip through Nevada.

W. D. Thomas of the Electric Railway & Manufacturers' Supply Company, San Francisco, returned the first of the week from a business trip to Southern California.

W. L. Goodwin, vice-president of the Pacific States Electric Company, San Francisco, returned during the week from a business trip through the San Joaquin Valley, Cal.

H. B. Vanzevoll, general manager of the Sunbeam Lamp Works, who has been on a business trip of the Pacific Coast, left San Francisco for Chicago the first of the week.

B. G. Tremaine, director of the National Lamp Works of the General Electric Company, Nela Park, Cleveland, Ohio, recently spent several days at San Francisco.

J. E. Burgess, superintendent of the Wonder Mining Company, Wonder, Nevada, is on a business trip to San Francisco for the purpose of making purchases of an electrical nature.

J. H. Montague, representing Chance Manufacturing Company, is visiting Pacific Coast cities, now being at Seattle, whence he will proceed to Centralia, Mo., by way of Salt Lake City.

Vladimie Karapetoff, professor of electrical engineering at Cornell University, and **Cyril M. Jansky,** associate professor of electrical engineering at the University of Wisconsin, are at San Francisco.

J. A. Vandegrift, in charge of the Oakland Lamp Works of the General Electric Company, Oakland, Cal., left the first of the week on a business trip to the company's home office at Nela Park, Cleveland, Ohio.

H. S. Jones, of the Busch-Sulzer Diesel Engine Company, San Francisco, delivered a very interesting illustrated lecture before senior students of the University of California at the company's exhibit at the Exposition during the week.

F. H. Murray, representative of the National Carbon Company, Los Angeles, who has been spending several days inspecting the company's exhibit at the Panama-Pacific Exposition, left for the southern city the latter part of the week.

R. T. Kahn has become associated with the sales force of the Electric Railway & Manufacturers' Supply Company, San Francisco, performing the duties of **W. T. Burns,** who has been given charge of the warehouse and shipping departments of that company.

S. C. Arentz has been elected president of the Utah Society of Engineers; **R. S. Lewis,** first vice-president; **W. A. Wilson,** second vice-president; **C. J. Ulrich,** secretary; **L. H. Krebs,** treasurer, and **S. O. Cannon,** past president. **O. W. Ott** was elected member of the executive committee.

O. L. Remington, of the Wm. McLean Co., Melbourne, Australia, and **H. P. McColl,** engineer with the same company, were recent arrivals at San Francisco, en route East on a tour of this country, investigating closely methods, machinery and developments of an electrical nature. After visiting the industrial centers of the East, they expect to sail for England.

OBITUARY.

William H. Bancroft, until February of this year, president of the Utah Light & Railway Company, died on April 23d, death resulting from a stroke of apoplexy. About a year ago Mr. Bancroft retired as vice-president and general manager of the Oregon Short Line Railroad Company, a position which he had held for twenty-three years, he having been selected by the late E. H. Harriman for this place when Mr. Harriman acquired control of the Oregon Short Line Railroad. When Mr. Harriman acquired control of the Utah Light & Railway Company about eight years ago, Mr. Bancroft was assigned to the responsible position as president of the company and upon him devolved the important task of rehabilitating the street railway and lighting and power system of Salt Lake City which was then in a very badly depreciated condition. He attacked the problem with his usual foresight and energy and made of the property one of the finest in the West, put it on a paying basis and amply demonstrated Mr. Harriman's judgment in making the selection.

MEETING NOTICES.

Portland Jovian League.

At the weekly meeting on April 30, C. A. Dederich was chairman of the day, the Fobes Supply Company furnishing the entertainment and donating an electric fan awarded as a gate prize. David Roth, a memory expert, told "what any man can accomplish by ordinary development of his mind by scientific methods." Good progress was reported by President C. E. Warner with regard to the Jovian show and electrical parade during the Rose Festival.

Electrical Development and Jovian League.

The regular weekly meeting of the league was held Wednesday at 12:15 P. M., being called to order by President Leggett. Reports of committees were heard, action on that of the Public Policy Committee regarding Jitney bus legislation being deferred temporarily pending action by the city government on the subject. Business being concluded, the meeting was turned over to W. H. Seaver, of the United States Steel Corporation, who acted as chairman of the day and provided instrumental music, introducing E. J. Schneider as speaker of the day. The subject of the talk was the steel company's exhibit at the Panama-Pacific International Exposition, telling in detail of the plans and arrangements under which the wonderful exhibit was assembled and installed. At the conclusion of the address a vote of thanks was given the speaker and also the chairman of the day.

San Diego Rejuvenation.

An attractively staged and successful rejuvenation was held in Southern California's exposition city, under the auspices of the San Diego Jovian League, on Wednesday, April 28th. Sixteen candidates were initiated, the ceremony being witnessed by 78 Jovians, 26 of whom were guests from Los Angeles, who had journeyed south during the afternoon in a special car. They were met at the station by the San Diego

Jovians and escorted to the exposition grounds, the rejuvenation taking place on the streets of Panama, Tribune H. C. Ayres acting as master of ceremonies. The candidates, in animal cages, were paraded through the Isthmus, with Henry Holland acting as guard. After the rejuvenation a banquet was served at the Alhambra Cafe, on the grounds, and during the festivities H. H. Cudmore and Ray Murphy were pinched and put in stocks by the sheriff of the '49 Camp. As a punishment for non-behavior bottles of beer were suspended just out of their reach. Speeches were made by several of those present, a high-class stag show followed, and, according to the official report, the party broke up at about 4 o'clock in the morning of the next day.

The Jovian Electrical League of Southern California.

The last luncheon of the league at the old quarters was held on April 28th, and was attended by a larger number of Jovians and their friends than the big dining hall at old Christopher's could accommodate. A splendid musical program was provided by A. B. Day, chairman of the day, and consisted of songs by C. Newton Graves, tenor; E. T. Betts, baritone, and F. E. Geiger. Among those present were: C. E. Burks, City Electrician of Phoenix; Robert L. Eltringham, of the California Industrial Accident Commission; E. F. Copeman, of the Copeman Electric Stove Company; Robert W. Allen, candidate for Mayor, and popular H. H. Cudmore, Potential 196. Tribune Pieper announced that there will be a rejuvenation on May 20, and appointed as an arrangement committee Messrs. Bliven, Simpson and Fischer. On motion of K. E. Van Kuran, it was decided to send a request to the Mayor of Philadelphia to have the Liberty Bell so routed that it will be shown in Los Angeles. A political address, entitled, "A Councilman's Platform," was delivered by City Councilman J. S. Conwell, who is seeking re-election at the coming primaries. He likened the city to a large stock company the largest, in fact, west of St. Louis, and the citizens its stockholders. This company has a yearly income of over $12,000,000, employs 4000 persons, paying them $3,000,000 in salaries and collects over $6,000,000 in taxes. He referred to the 16 leading planks in his platform as follows: (1) Annexation of contiguous territory and distribution of aqueduct water and completion of city's power plant; (2) extension for harbor facilities, this being the best man-made harbor in the world, on which the government has already spent $11,000,000; (3) rerouting of street cars so as to minimize congestion; (4) installation of a new fire alarm system, upon recommendation of the Jovian League; (5) the opening of Bunker Hill; (6) a larger fund for library operation; (7) unification of city and county tax collections, and later city and county consolidation; (8) the early remodeling of the antiquated city charter; (9) the establishment of an adequate "unemployment" fund; (10) a solution of the undeterminate franchise problem; (11) elimination of grade crossings; (12) the purchase of the aqueduct cement plant, now standing idle; (13) giving preference to local products in the purchase of the city's supplies, amounting to over a million dollars per year; (14) the preparation of a scientific city budget; (15) reduction of cost of street improvements; (16) the curtailing of special assessments, which have amounted to $15,500,000 in five years. The councilman then recalled his own record, citing some striking incidents relative to the city's wonderful growth.

Electrical Baseball Game.

A hotly contested game of baseball between teams made up of members of the Alameda County Electrical Development League and the Electrical Development and Jovian League of San Francisco resulted in a tie score of 10 to 10, after ten innings on Saturday afternoon, May 1. The Alameda team was captained by F. H. Woodward of the Great Western Power Company, and the San Francisco aggregation by W. R. Dunbar of the Great Western Power Company. A return match will be played May 15th and the commendable "get acquainted" purpose of these matches still further promoted. Following is the box score by Scorer Carl Ely, according to the rulings of Umpire C. H. Pennoyer:

Alameda Co.	R.	H.	E.
Callahan, ss.	2	1	1
Anderson, 3b.	2	4	1
Cowles, 1b.	1	1	1
Martinez, c.f.	2	2	1
DeVaney, rf. & p.	0	0	0
Woodward, 2b.	2	3	0
Larue, lf.	1	2	1
Zanheiser, c.	0	1	0
Tarra, p. & rf.	0	1	0
	10	15	5

San Francisco.	R.	H.	E.
Crosswaite, 3b.	2	2	0
Dunbar, p.	0	2	0
Hickox, 1b.	2	2	0
Flynn, c.	2	0	1
Mensing, ss.	2	2	0
Black, 2b.	1	0	0
Sharon, rf.	0	3	2
Fisher, lf. & 3b.	1	1	1
Newlands, cf.	0	0	1
	10	12	5

PROGRAM FOR THE SAN FRANCISCO CONVENTION NATIONAL ELECTRIC LIGHT ASSOCIATION

Herewith is given the tentative program of the work to be done by the San Francisco Convention of the National Electric Light Association, June 7-11, 1915:

Tuesday, June 8, 10:00 A. M.

First General Session:—(1) Welcome to the City—Mayor Rolph; (2) Welcome to the Coast—John A. Britton; (3) Address of President Scott; (4) Announcements; (5) Report of Committee on Organization of the Industry—Geo. Williams; (6) Report of the Secretary—T. C. Martin; (7) Report of Insurance Expert—W. H. Blood, Jr.; (8) Report of Committee on Progress—T. C. Martin; (9) Report on Question Box—S. A. Sewall; (10) Report of Committee on Education—J. F. Gilchrist; (11) Paper: Revivals—Paul Lupke.

Tuesday, 2:30 P. M.

First Technical Session:—(1) Report of Committee on Meters—C. G. Durfee; (2) Report of Committee on Electrical Apparatus—L. L. Elden; (3) Report of Committee on Grounding Secondaries—Paul Spencer; (4) Paper: Application of the Diversity Factor—H. B. Gear; (5) Address: Features of the Lighting of the Panama-Pacific Exposition—W. D'A. Ryan.

Tuesday, 2:30 P. M.

First Accounting Session:—(1) Chairman's Address—H. M. Edwards; (2) Report of the Library Committee—E. J. Allegaert; (3) Report of the Question Box Committee—E. C. Scobell; (4) Report of the Committee on N. E. L. A. Uniform System of Accounts—J. L. Bailey; (5) Paper: Some Opportunities of Public Utility Accountants—L. H. Reynolds (Auditor California Railroad Commission).

Tuesday, 2:30 P. M.

First Commercial Session:—(1) Chairman's Address and ,2) Report of Committee on Foreign Relations—Douglass Burnett; (3) Report of Commercial Section Finance Committee —J. F. Becker; (4) Report of Membership Committee—J. G. Learned; (5) Report of Publications Committee—E. A. Edkins and (5a) Report of Sub-Committee on Salesman's Handbook—C. J. Russell; (6) Report of Committee on Education of Salesmen—F. R. Jenkins; (7) Report of Committee on Commercial Department Terminology—M. E. Turner.

Wednesday, June 9, 10:00 A. M.

First Hydroelectric and Second Technical Session:—(1) Address of Chairman of Hydroelectric Committee—M. R. Bump: (2) Report of Committee on Hydroelectric and Transmission Progress—T. C. Martin; (3) Report of Committee on Prime Movers—I. E. Moultrop; (4) Paper: Practice in High-Head Hydraulic Plants—J. P. Jollyman; (5) Paper: Analysis of Governor Effort—E. D. Searing; Paper: Oil Burning—P. M. Downing.

Wednesday, 10 A. M.

Second Commercial Session:—(1) Address: C. C. Moore, president Panama-Pacific Exposition; (2) Report of Power

Sales Committee on Typical Power Sales Development in the West—J. H. McDougal; (3) Report of Committee on Merchandising and Recent Development of Electric Appliances—R. R. Young.

Wednesday, 10:00 A. M.

Second Accounting Session:—(1) Paper: Workmen's Compensation Insurance—R. J. Sullivan (secretary Travelers' Insurance Co.); (2) Paper: Electric Vehicle Cost Accounting—W. P. Kennedy; (3) Paper: Standardizing the Accounts of the Pacific Gas & Electric Co.—M. H. Bridges; (4) Paper: Record of Property or Construction Expenditures—P. R. Ferguson.

Wednesday, 2:30 P. M.

Third Commercial Session:—(1) Report of Lamp Committee—F. W. Smith; (2) Report of Committee on Wiring of Existing Buildings—R. S. Hale.

Wednesday, 2:30 P. M.

Second Hydroelectric and Third Technical Session:—(1) Report of Committee on Overhead Line Construction—Thos. Sproule; (2) Paper: Overhead Line Construction on the Coast—J. C. Martin; (3) Report of Hydroelectric Sub-Committee on High Tension Transmission and Construction—R. J. McClelland; (4) Report of Hydroelectric Sub-Committee on High Tension Apparatus—W. N. Ryerson; (5) Report of Hydroelectric Sub-Committee on Main Line Electrification of Railroads—B. F. Wood.

Thursday, June 10, 10:00 A. M.

Third Accounting Session:—(1) Report of Committee on Cost Accounting—J. H. Gulick; (2) Paper: Analysis of Costs by an Electricity Supply Company for Rate Making Purposes—A. D. Spencer and R. W. Symes; (3) Paper: Analytical Accounting for Central Station Purposes—O. B. Coldwell; (4) Presentation and Adoption of New Accounting Section By-Laws; (5) Report of the Nominating Committee; (6) Installation of Section Officers; (7) Adjournment.

Thursday, 10:00 A. M.

Fourth Commercial Session:—(1) Report of Rate Research Committee—R. S. Hale; (2) Report of Power Sales Bureau of the Commercial Section—C. J. Russell; (3) Paper: The Commercial Application of Resistance Furnaces—C. W. Bartlett; (4) Paper: A Stassano Furnace Installation at Redondo, Cal.—W. M. McKnight; (5) Paper: Electric Furnace Power Loads—F. T. Snyder; (6) Paper: Charges for Electric Welding Service—C. K. Nichols.

Thursday, 10:00 A. M.

Fourth Technical Session:—(1) Report of Committee on Terminology—A. S. McAllister; (2) Report of Committee on Street Lighting—J. W. Lieb; (3) Report of Committee on Underground Construction—P. Torchio; (4) Timber Preservation—R. A. Griffin; (5) Report of Committee on Accident Prevention—M. J. Insull; (7) Paper: Opportunities of the Public Service Companies in General Accident Prevention—C. B. Scott; (8) Adjournment.

Thursday, 8:45 P. M.

Public Policy Meeting:—(1) Reading Report of the Public Policy Committee—W. W. Freeman; (2) Address: Public Service Commission Relationships—John H. Roemer

Friday, June 11, 10:00 A. M.

Fifth Commercial Session:—(1) Report of Committee on Power Methods: Demonstration of a Power Sale—C. H. Stevens; (2) Completion of Unfinished Business; (3) Report of Section Nominating Committee; (4) Election of Section Officers; (5) Adjournment.

Friday, 10:00 A. M.

Second General Executive Sessions:—(1) Report of Committee on Company Sections—F. J. Arnold; (2) Paper: Company Section Work—D. C. Bruce; (3) Paper: The Electric Vehicle and the Central Station—J. F. Gilchrist and A. J. Marshall; (4) Address: Electrical Prosperity Week—J. M. Wakeman; (5) Report of Committee on Doherty and Billings Prizes for Company Section Papers—P. Lupke; (6) Report of the Committee on Memorials—T. C. Martin; (7) Report of Committee on President's Address; (8) Report of Committee on Resolutions; (9) Report of Nominating Committee; (10) Election of Officers; (11) Adjournment.

INTERNATIONAL JURY OF AWARDS.

Department of Machinery Exhibits, Electrical Groups, All Departments.

Appointed by Chief, Department of Machinery—Mr. Carl Hering, consulting engineer, 929 Chestnut street, Philadelphia, Pa.; Professor C. M. Jansky, professor of electrical engineering, University of Wisconsin, Madison, Wis.; Mr. Wm. Onken, managing editor of "Electrical World," 239 West Thirty-ninth street, New York City, N. Y.; Mrs. C. P. Poole, consulting engineer, 1021 Candler building, Atlanta, Ga.

Appointed by Chief, Department of Transportation—George A. Damon, dean of engineering, Throop College of Technology, Pasadena, Cal.; Mr. A. H. Babcock, electrical engineer, Southern Pacific Company, San Francisco, Cal.; Professor V. Karapetoff, professor of electrical engineering, Cornell University, Ithaca, N. Y.

Appointed by Chief, Department of Manufactures—Professor H. J. Ryan, professor of electrical engineering, Stanford University, Palo Alto, Cal.; Mr. Guy L. Bayley, chief of electricity, Panama-Pacific International Exposition, San Francisco. Cal.

Appointed by Chief, Department of Liberal Arts—Mr. A. H. Halloran, managing editor and vice-president of "Journal of Electricity, Power & Gas," San Francisco, Cal.; Mr. Charles A. Rolfe, president Southwest Home Telephone Company, Redland, Cal.; Mr. Frank Wolfe, Government exhibit, Palace of Liberal Arts, Exposition grounds. Italy—Vito Capastini.

Groups 85 to 88, Inclusive.

Captain B. C. Bryan, U. S. N., Bureau of Steam Engineering, Washington, D. C.; Professor H. W. Hibbard, professor of mechanical engineering, University of Missouri, Columbia, Mo.; Mr. John Hunter, chief engineer Union Electric Light & Power Company, St. Louis, Mo.; Mr. F. R. Low, editor of "Power," 239 West Thirty-ninth street, New York City, N. Y.; Professor C. E. Lucke, professor of Mechanical engineering, Columbia University, New York City, N. Y.; Engineer in Chief C. A. McAllister, U. S. Coast Guard, Treasury Department, Washington, D. C.; Mr. Wynn Meredith, consulting engineer (with Sanderson & Porter), Nevada Bank building, San Francisco, Cal. Italy—Andrea Gianini.

Group 89.

Mr. N. A. Bowers, Pacific Coast editor McGraw Publishing Company, Rialto building, San Francisco, Cal.; Mr. George M. Brill, mechanical engineer, 2534 Hillegass avenue, Berkeley, Cal.; Mr. Harry Bringhurst, fire marshal, fire headquarters, Seattle, Wash.; Professor Wm. H. Kavanaugh, professor of mechanical engineering, University of Minnesota, Minneapolis, Minn.; Mr. Thomas Morrin, consulting engineer, Phelan building, San Francisco, Cal.; Mr. Calvin Rice, secretary American Society of Mechanical Engineers, 29 West Thirty-ninth street, New York City, N. Y.; Mr. Jesse M. Smith, consulting engineer, Hotel Oakland, Cakland, Cal. China—Emil S. Fischer.

Group 90.

Mr. Wm. Crosby, President The Crosby Company, Buffalo, N. Y.; Mr. George W. Dickie, consulting engineer, 24 California street, San Francisco, Cal.; Professor John T. Faig, professor of mechanical engineering, University of Cincinnati, Cincinnati, Ohio; Mr. F. J. Frank, secretary and advertising manager "Iron Age," 239 West Thirty-ninth street, New York City; Mr. J. C. Mengel, master mechanic Pennsylvania Railroad Company, Altoona shops, Altoona, Pa.; Mr. D. S. Watkins, assistant superintendent of shops, Southern Pacific Company, Sacramento, Cal.

NEWS NOTES

INCORPORATIONS.

RENO, NEVADA.—Nevada Gas, Heat & Light Company, $1,500,000, shares $1 each, subscribed $200, by H. H. Dunbar, C. C. Manker, T. B. Wakefield, G. E. Wakefield and J. McC. Smith.

MEDICINE BOW, WYOMING.—Articles of incorporation have been filed for the Medicine Bow Electric Company, whose object is to supply the town with power and light. Its capital is $10,000 and the incorporators are E. Anderson, S. H. Scofield, F. W. Shields, H. W. Richards.

FINANCIAL.

BOISE, IDAHO.—All the properties operated by the Idaho Railway, Light & Power Company, with the possible exception of the lines formerly operated by the Boise Railroad Company, will be sold at public auction some time in June. Judge Dietrick signed a decree of foreclosure April 19th in the suit of the Guaranty Trust Company of New York against the railway company, the Idaho Traction Company a former owner; E. H. Jennings and O. G. F. Markhus, receiver. Mr. Markhus is appointed special master in chancery to dispose of the property. The claim of the trust company on the railroad company's holdings is based on a mortgage over the entire property of the system, given to secure an issue of thirty million dollars' face value first and refunding mortgage bonds of the railway company. Of this issue, bonds of a face value of $9,095,000 were delivered to the railway company, and of these 8449, valued at one thousand dollars each, have been delivered to purchasers. For this amount the trust company is responsible. The interest was defaulted on the bonds in July and December, 1914, and the trust company alleged a breach of contract and brought suit for foreclosure. The sale will be made from the steps of the Ada County courthouse. Bidders must furnish cash or certified checks on Boise, New York or Chicago banks to the amount of fifty thousand dollars to show their good intentions.

ILLUMINATION.

ESCONDIDO, CAL.—The city trustees have voted to start proceedings to purchase the Escondido Utilities gas and electric plant.

DEER LODGE, MONT.—A contract for the installation of an electric light systems has been awarded to C. W. Currah, Helena, for $4220.

CORVALLIS, ORE.—It is rumored that the Portland Gas & Coke Company, will construct a gas plant between Corvallis and Albany to supply both cities.

PORTLAND, ORE.—The council has rejected bids for installing a lighting system in Laurelhurst and Kenilworth parks and will perform work by day labor.

MOSCOW, IDAHO.—The city has closed a contract with the Washington Water Power Company for street lights. Arc lights are to be changed to tungsten lights.

ELLENSBURG, WASH.—The council rejected all bids submitted for the improvement of the light plant, the estimated cost of which is $60,000. Another call will be issued.

SANTA ANA, CAL.—At a meeting of the Board of Supervisors May 22d was set as the date for holding an election at Buena Park upon the proposal to form a street lighting district.

GUERNEVILLE, CAL.—An election will be held on May 12th, at which time the proposition of forming a Highway lighting district to be known as the "Guerneville Highway Lighting District," will be voted upon.

SODA SPRINGS, IDAHO.—The city council has called a special election, to be held May 15th, to vote on the issuance of $15,000 bonds for the purpose of installing a municipal electric light and power plant. Paul Tipton is village clerk.

OREGON CITY, ORE.—E. P. Preble, owner of a ranch between Barlow and Aurora, has completed plans for the installation of a small electric light and power plant to be operated by water power and gasoline engine, power to operate farm machinery.

GADSEN, ARIZ.—A company of local citizens has been formed to supply electric light and power. A plant has been purchased and will be installed soon. The company will probably install a water system at the same time. Arrangements have also been made for putting in a telephone system.

SANTA BARBARA, CAL.—A plan for turning State street, from Sola to the beach, into an ornamental lighting district, is in the hands of a committee consisting of E. P. Dunn, Dr. Bakewell, L. E. Gagnier, D. H. Schauer, E. B. Ashcraft, J. S. Reynolds and others who will petition property owners on blocks not yet lighted, to sign for lighting, and the petition will then be filed with the city council, asking that an assessment district be formed.

SILVERTON, OREGON.—Bids will be received by the city recorder until May 14th, for the following items in connection with the construction of a lighting system in Silverton. All labor and material and complete installation of a lighting system as per division A of specifications and electrical energy for such lighting system for a period of five years. All labor and materials, construction, installation and maintenance, according to plans B and C.

CALDWELL, IDAHO.—Caldwell, through its commercial club, has taken the initiative in a move to get the cities and towns of this region to unite in arranging with Black Canyon irrigation district for municipal lighting plants. It is figured that one-third of the 15,000 h.p. to be generated by the proposed plant of the district will be for sale the year round and that two-thirds of the amount will be for sale during the winter months. The promoters declare that this current will be sold at a rate which will popularize its use for heating purposes over this territory as well as for lighting.

VERNAL, UTAH.—John Glenn, Marcellous Pope of this city, and R. W. Kroupa of Duchesne, have secured a franchise from the city council for an electric light and power plant in Duchesne and will commence work at once erecting a building. The cost is estimated at $10,000. They propose to give Duchesne a first class electric plant. The plant will be erected in the center of the city. The river makes a horseshoe bend and the fall is so great that a canal cutting the point will give a fall of 13 feet, which will be utilized for power. Modern machinery has been ordered. By the terms of the franchise the entire plant must be in operation within 18 months. Light will be supplied to settlers in the surrounding country.

TRANSMISSION.

ALAMEDA, CAL.—The commission of electricity is preparing an extension of service to Bay Farm Island.

GOLDFIELD, NEV.—The Nevada Copper Mining, Milling & Power Company has completed final arrangements for the construction of a power line to this camp.

BEND, ORE.—The city council has granted a general electric franchise to John Steidl and Thomas Tweet, who own a portion of the power rights at the north canal below the Deschutes River.

LOS ANGELES, CAL.—The Woodill-Hulse Electric Company has been awarded the contract by the Harbor Commisson for the installation of electric wiring of the transit shed at the municipal dock No. 1, on the outer harbor, for $2945.

ST. ANTHONY, IDAHO.—A franchise has been granted by the council to the Utah Power & Light Company to construct and maintain a power dam and spillway across the north fork of Snake River at or near the upper end of the island.

SPOKANE, WASH.—The county commissioners have received a petition from the Little Spokane Light & Power Company for the extension of the power line from Deer Park to Arcadia Orchards Company tract. The power is to be used for pumping.

SANTA FE, N. M.—A dam 100 ft. high is to be built across White Rock canyon to create power for use in Albuquerque, Santa Fe and the Estancia valley, under an application of the Rio Grande Light & Power Company of Philadelphia, filed with the state engineer.

PORT TOWNSEND, WASH.—James P. Holman has made application to the board of county commissioners of Jefferson county for a franchise for certain rights and privileges to construct, maintain and operate certain transmission lines for energy, power, heat and light over certain roads, etc. Hearing, May 5th.

VANCOUVER, B. C.—The city council is considering the purchase of a water power site and three sites are under consideration. W. R. Bonnycastle has two sites within his control which are being considered, and A. W. V. Innes and H. B. Dutcher have presented a proposition for a site on Cheakamus River, where it is stated that there are potentialities for developing 100,000 h.p.

TRANSPORTATION.

SAN FRANCISCO, CAL.—The city engineer has reported the completion of the California Street Municipal Railway line by Contractor F. Rolandi. The estimated cost under the contract was $101,308. The work done by the contractor in accordance with the specifications amounted, however, to $105,639, and the total due him was increased to $114,495, by an allowance of $1806 for extra work and a bonus of $7500.

OGDEN, UTAH.—Extension of the Ogden, Logan & Boise Railway's interurban lines to connect Brigham City of the Ogden division with Wellsville of the Logan division has been authorized by the directors and the Utah Construction Company was authorized to proceed at once with the construction work on the link which will connect Ogden and Logan by an electric interurban line. Ultimately, the interurban railway officers declare, Ogden and Preston, Idaho, will be connected by electric line, for the company, is working on the extension from Logan north to Preston. Another important extension now under way is the Ogden Canyon line into Huntsville.

TELEPHONE AND TELEGRAPH.

SPRINGER, N. M.—Farmers on the French tract north and northwest of Springer, are making arrangements to install a telephone system.

SILVER CITY, N. M.—The Mountain States Telephone & Telegraph Company will install a new battery, after making necessary repairs to the local telephone exchange. The improvements will cost about $15,000.

ASTORIA, ORE.—A powerful wireless station has just been completed at Ketchikan, Alaska, for the Marconi Wireless Company. This plant is intended by the company to be the first link in a wireless chain which is to cover the Alaskan territory. The United States end of the chain will be located in this city.

WATERWORKS.

SPARKS, NEVADA.—The Reno Power, Light & Water Company is preparing to extend the water mains of this city during the next two months.

HONOLULU, T. H.—Sealed bids in triplicate, for construction of a water distribution and sewer system at Fort Kamahameha, will be received up to May 17th.

PPRESCOTT, WASH.—Bids will be received until May 24th for improvements to the Prescott water system, according to plans and specifications on file with the city clerk.

PALO ALTO, CAL.—The board of public works has awarded the contract for the construction of water main extensions, to James Stanley Sr., of Sausalito, on his bid of $13,396.

HEALDSBURG, CAL.—The city has entered into a contract with the National Water Meater Company of San Francisco to purchase all city meters from that company for a term of one year.

BANNING, CAL.—Of the $80,000 bond issue recently pledged, $60,000 will be used by the Banning Water Company in improving and enlarging the irrigation and domestic water systems serving this community. The bonds are about to be sold and work of construction will probably be started in June.

TACOMA, WASH.—A valuation of $88,500 was fixed on the water plant and system of the Washington Public Service Corporation in Olympia by a jury in Superior Judge Clifford's court last week, in the suit brought by the City of Olympia to determine the price to be paid for the property which is to be taken over and opertaed a sa municipal utility.

OREGON CITY, ORE.—Improvements that will result in a better water system for Canby are being planned by M. J. Lee, owner of the Canby water works. A new tower with a capacity of 75,000 gallons, and placed on a 60 ft. platform, will replace the present one which holds only 10,000 gallons.

MONROE, ORE.—The city council has passed an ordinance calling for an election May 14th on a proposition to issue bonds to the amount of $3000 to install a municipal water system. The plans call for a gasoline engine pumping plant, with pressure tank and water tower, the taking over of the private plant, extensions of the supply and service pipes, and the installation of more hydrants.

SACRAMENTO, CAL.—According to the bond checks and rough estimates of the various bids received for the new water system, the Mathews Construction Company of Sacramento and James Kennedy of Los Angeles are the lowest bidders, as both their figures are estimated at about $725,000. The Schaw-Batcher Company of Sacramento and the Graff Construction Company of Sacramento and Portland are also figuring in the final estimate. The bidders and the amount of the certified check that accompanied each bid follows: Schaw-Batcher Company of Sacramento, $80,000; F. Rolandi of San Francisco, $115,000; Bates, Borland and Ayres of Oakland, $90,000; Hans Pederson of Seattle, $100,000; James Kennedy of Los Angeles, $80,000; Sutherlin Construction Company of Kansas City, Mo., $80,000; Craff Construction Company of Sacramento, $75,000; Turner Company of San Francisco, $86,000; Clark & Henery Construction Company of Stockton, $100,000. Eaton & Smith of San Francisco, $90,000; Mathews Construction Company of Sacramento, $80,000, and P. E. McHugh of Tacoma, $80,000.